IOWA STATE UNIVERSITY
College of Engineering

Recycled Plastic Furniture for Ghana

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4/15/14

Statement of Need

PZR3

Project Objective

	Planned	Delivered
Desk	Weight Cost Durability	Weight Durability
Mold	Simple Smaller and Fewer Pieces	Simple Smaller and Fewer Pieces
Heating Implement	Size Fuel	Not Addressed

Slide 3

PZR3 Proj. Obj.- What did your team originally set out to achieve.

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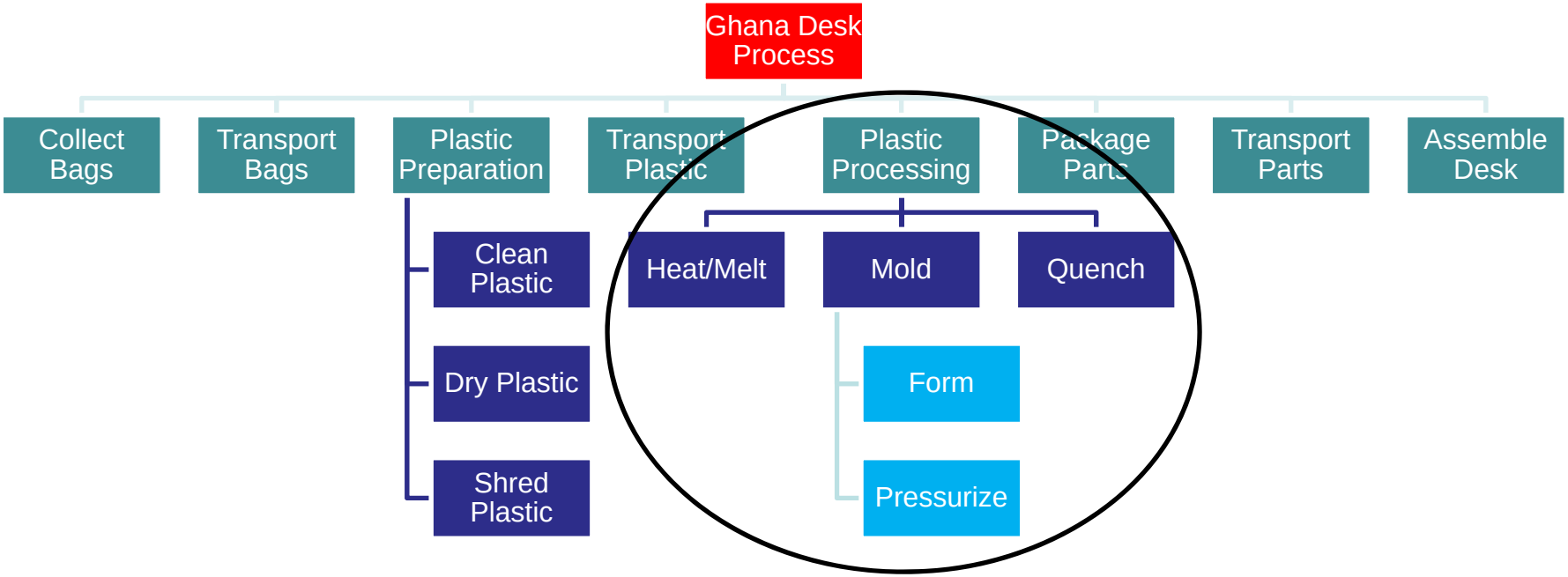
Process Function Tree



PZR2

Customer Needs/ Performance Goals

Desk Properties and Specifications	
Comfortable	Student Height: 200 cm
Sturdy and Durable	Supports > 100 kg
Light Weight	Weighs < 20 kg
Economically Feasible	Comparable Cost

PZR4

Slide 5

PZR2 Customer Needs/Preformance Goals- Briefly list and descrive the customer requirements and performance goals that you derived from research, benchmarking and analysis. SEE ASSIGNMENT A03

Pennock, Zane R, 12/8/2013

PZR4 A picture of somebody using the desk seemed appropriate.

Pennock, Zane R, 12/8/2013

Customer Needs/ Performance Goals

- Molding Process
  - Utilizes Appropriate Technology
  - Simple, Repeatable and Safe
  - Efficient and Economically Feasible

Raw Material Testing

Sample PZR7	Melting Temperature (°C)	Enthalpy Of Fusion (J/g)	Heat Rate (°C/min)	T_g (°C)	Stiffness (MPa)
HDPE	137	164	10	56	1204
Water Sachet	129	168	10	56	1157

PZR7 Perfromance Results- Briefly Summarize important modeling and/or testing results and how they impacted the final design.

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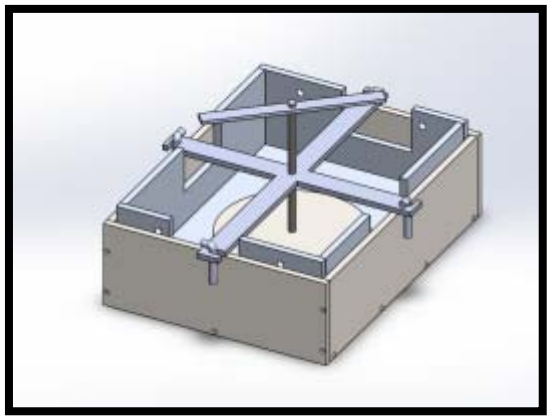
PZR11
PZR12

Prototype Fabrication



Slide 8

PZR11 Final Design- Use graphics, CAD models, and Function Flow Diagrams to show proposed final system design.
Pennock, Zane R, 12/8/2013

PZR12 Do we need the function flow? Will it add to the slide?
Pennock, Zane R, 12/8/2013

Performance Results

- Process Testing
  - Plastic
    - Preparation
    - Amount
    - Arrangement
  - Pressure
    - Gravity
    - Applied
  - Lubrication

PZR10

PZR10 Perfromance Results- Briefly Summarize important modeling and/or testing results and how they impacted the final design.
Pennock, Zane R, 12/8/2013

Performance Results

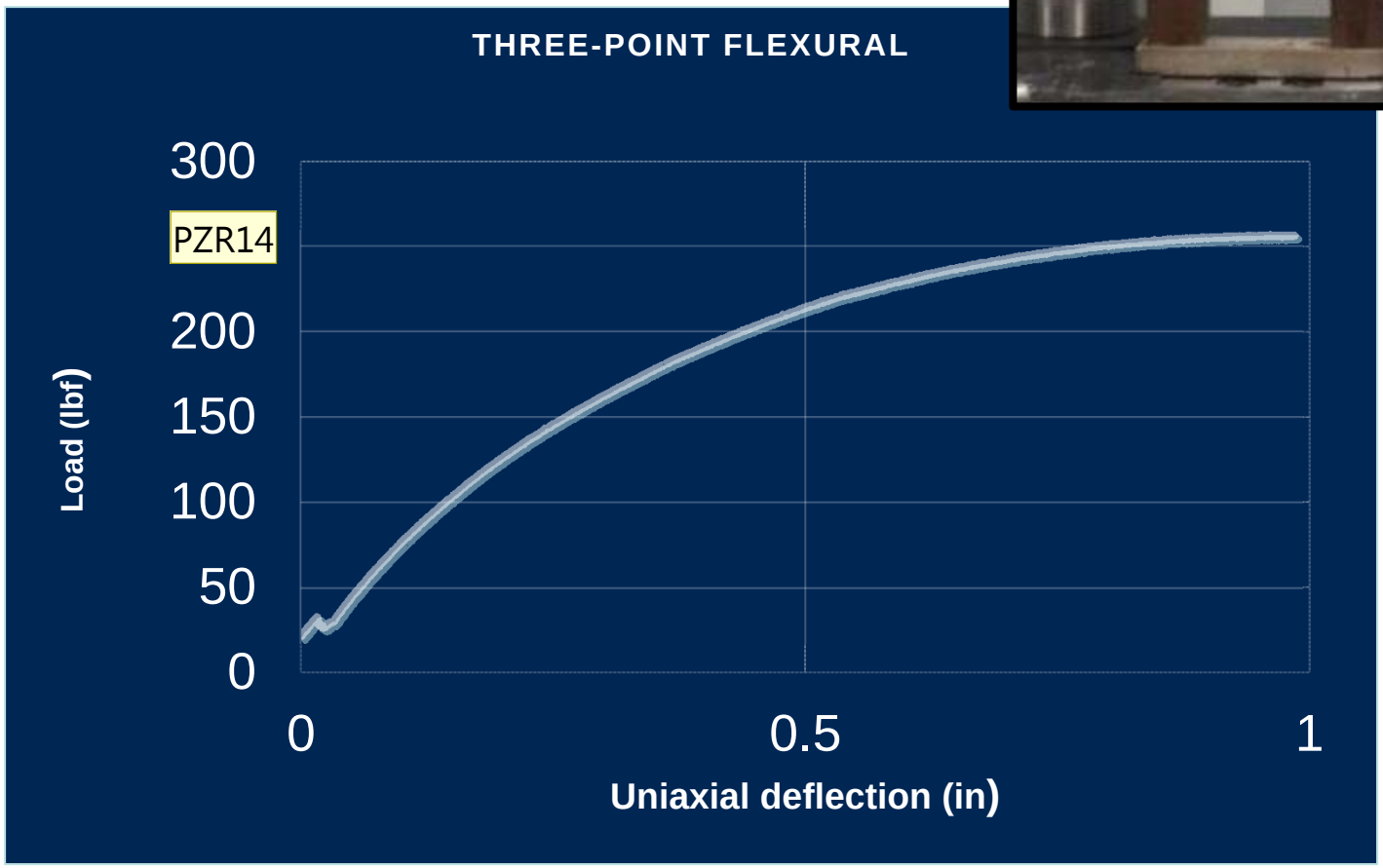
PZR13

Slide 10

PZR13 Perfromance Results- Briefly Summarize important modeling and/or testing results and how they impacted the final design.
Pennock, Zane R, 12/8/2013

Performance Results

- Strength Testing



Slide 11

PZR14 Perfromance Results- Briefly Summarize important modeling and/or testing results and how they impacted the final design.

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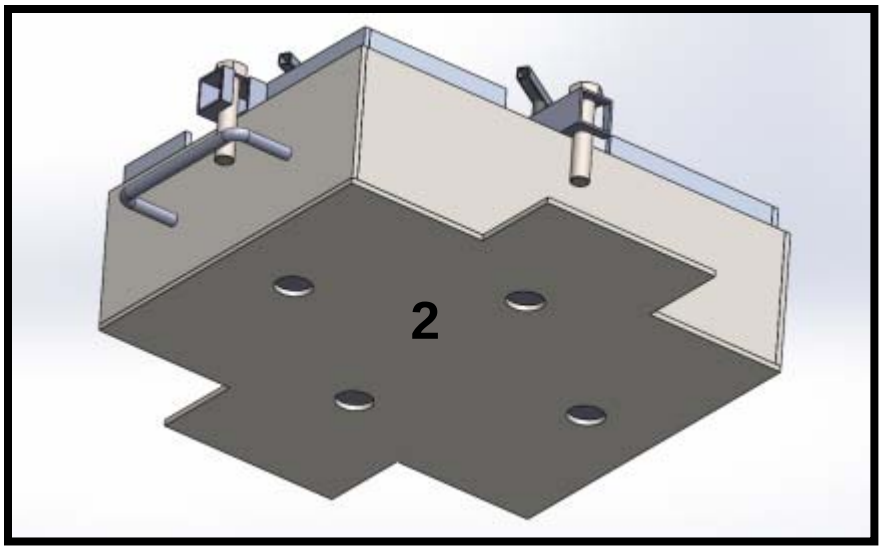
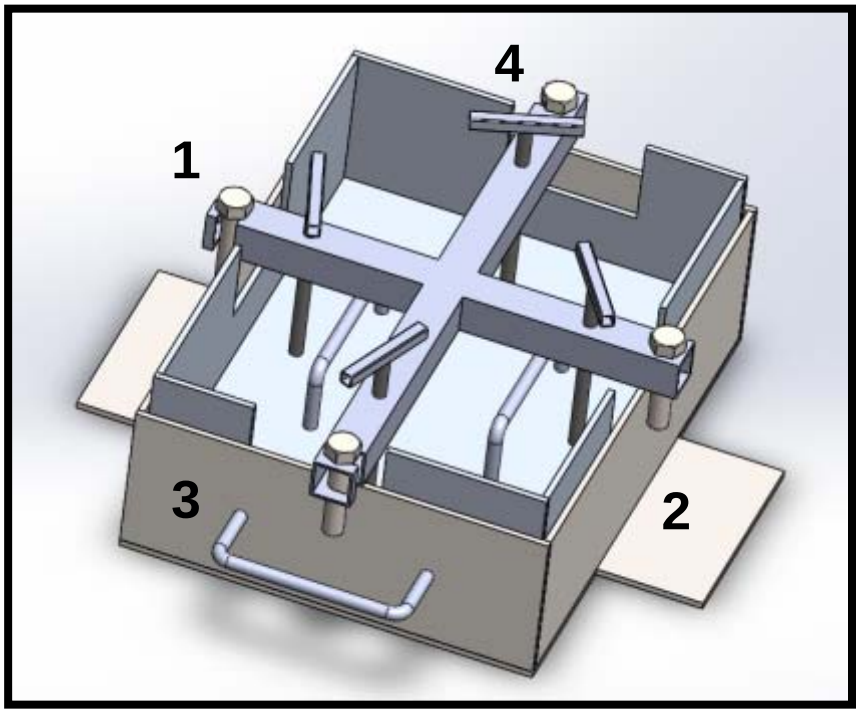
PZR5
PZR6

Final Design

1. Pressure Apparatus Securement
2. Ease of Plastic Removal
3. Ease of Transport
4. Even Pressure Application





Slide 12

PZR5 Final Design- Use graphics, CAD models, and Function Flow Diagrams to show proposed final system design.
Pennock, Zane R, 12/8/2013

PZR6 Do we need the function flow? Will it add to the slide?
Pennock, Zane R, 12/8/2013

Design Cost

Material	Cost
4’ x 4’ x ½” reused Aluminum	$100
Water Jut Cutting	$100
Bolts (100 pack)	$15.84
Fabrication Labor	Covered
Material For Pressure Application	Donated

PZR8
PZR9

Design Challenges

- Even Pressure
- Rate of Pressure
- Simplicity
- Size of Mold
- Quenching Process
- Part Removal
- Lifespan

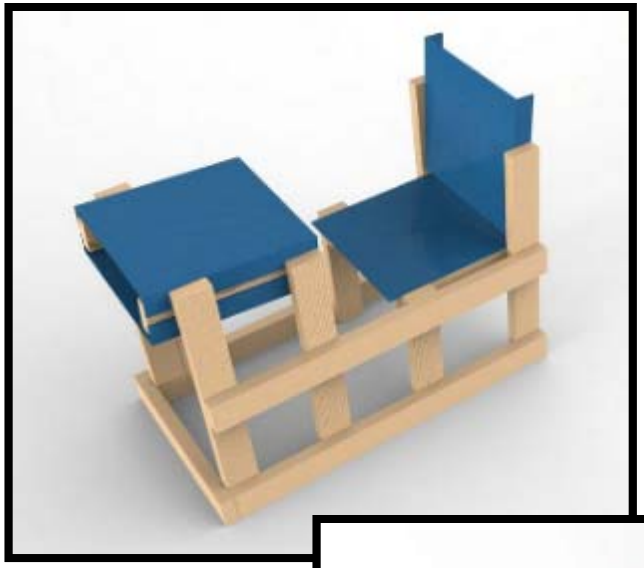
Slide 14

PZR8 Design Challenges/Risk Mgt. Plan- What risks for design failure remain? Using original DFMEA and disocoveries from testing, describe what risks remain. How does your design change or what strategies would be implement to mitigate risks?
Pennock, Zane R, 12/8/2013

PZR9 I think that it makes sense for this slide to be place before or directly after the final design slide.
Pennock, Zane R, 12/8/2013

Future Work

- Build and Test Further Prototypes
- Enhance Material Strength
- Determine Desk Design
- Optimize Furnace Design
- Overall Process Design
  - Collection → Finished Product



Sources

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Questions?